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A Secondary Remedial Reading Program Based on Principles of Reinforcement Theory.

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A program for secondary remedial reading instruction was developed to use operant conditioning techniques with the following major objectives: (1) to train the student to decode words systematically, (2) to develop the student's verbal repertoire, (3) to improve reading comprehension, and (4) to shape scholarly attitudes and behavior. Pupils were placed in one of two sections according to word attack proficiency and were given instruction for 5 hours per week in the reading lab. The laboratory instruction included verbal training sessions, guided comprehension practice, vocabulary emission taped sessions and written sessions, and recreational reading. The effects of this program on 50 freshmen and sophomore high school students were compared with a matched control group. Pretest and post-test scores on the Gates McGinitie Comprehension Test and the California Phonics Test showed that while both experimental and control groups made significant pre to post mean gains, the experimental group mean scores exceeded the mean scores of the control group on both tests. Tables and references are included. (CM)

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A SECONDARY REMEDIAL READING PROGRAM BASED ON PRINCIPLES OF REINFORCEMENT THEORY

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Fremont, California 94538

June, 1969

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Leonard and Joan Schaeffer

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SUMMARY

During the past five years, the authors have been developing and implementing a program for the retarded reader at the secondary level. In addition to developing materials and methods, the authors have attempted to bring under control many other important aspects of the learning situation, and to include information about these as an integral part of the total set of procedures.

The primary purpose of this grant has been to refine, revise, and further develop materials and procedures into a model secondary remedial program, one which can be replicated and used in a variety of teaching situations. The secondary purpose was to evaluate the effect of this program on a group of high school students reading well below grade level expectations.

Some of the major characteristics of the program are listed below:

1. Operant conditioning techniques are used:

   a. to train the student to decode words systematically.

   b. to develop the student's verbal repertoire.

   c. to increase the student's comprehension of materials having increasingly involved syntax and concept density.

   d. to shape scholarly behavior and attitudes.

2. Most of the materials and virtually all of the procedures have been developed in the classroom as a result of interaction with hundreds of students who are retarded in reading.

3. All materials and procedures are designed to teach directly. No approach is used whereby learning is incidental, a "by-product" of learning experiences selected primarily because of intrinsic interest, variety, motivation, etc.

The effects of this program on a group of freshman and sophomore high school students was studied. Groups were matched on the basis of age, I.Q., reading comprehension, and scores received on the California Phonics Test.

At the end of the school year, post test scores were taken on the reading comprehension and phonics tests, and a statistical analysis was made to determine whether difference, if any, between the mean pre- and post test scores of experimental and control groups approached significance. Both groups made gains that approached significance on both the comprehension and phonics tests. However, the significant t test values resulting from the analyses of the difference in gains in the two groups indicate that the mean gains of the experimental group clearly surpassed the mean gains of the control group on both the reading comprehension and the phonics test.

Conclusions:

The teaching materials and other procedures used in this program appear to constitute a promising attack on retardation in reading. Because extensive use is made of the aural reinforcement of sound-symbol relationships, the word attack procedures appear to be effective in teaching students who have long-standing word recognition handicaps. Procedures used to increase verbal repertoires give evidence of adding substantially tc students' store of verbal meanings, in both understanding and usage aspects. Scholarly work habits, pride in achievement, and concern for accuracy are instilled through reinforcing procedures and a controlled learning environment.

This is a total, integrated program for building reading skill at the secondary level, one which includes all necessary materials to achieve its chosen goals. It uses procedures which are objective, specific, and detailed. It could, therefore, become a prototype, a model remedial reading program, applicable to a variety of school situations, and a point of departure for further experimentation.

A. THE PROGRAM IN ITS PRESENT STATE

I. INTRODUCTION

The authors are developing a teaching program which is specifically designed to attack the underlying causes of poor reading ability. The purpose of this grant has been to refine, revise, and further develop materials and procedures into a model secondary remedial reading program and to evaluate the effect of this program on a group of high school students reading well below grade level expectancies. The first part of this paper will discuss this program in its present state, including background, theoretical rationale, objectives, and procedures. The remainder of the report will describe its experimental evaluation.

a. Needed: "What Happens If?" Research

Brownell, (1) deploring excessive reliance on the comparison study as a means of upgrading instruction, advocates more extensive use of the "What happens if"? approach, in which materials are first theoretically formulated--are developed--and are then empirically modified during the course of extensive work with students.

Says Brownell:

> "In research simple in design, we could select a reasonably large sample of Grade 5 children, determine their characteristics in detail, and teach them as planned. We would then note carefully what occurs from day to day--which children progress rapidly, and which slowly, and why, at what point in the sequence of subject matter topic learning problems arise, what they are and why they appear; which instructional devices or aids are successful, which are unsuccessful, and why. Our procedures would be those of testing, interviewing, and observing." (1, P. 51-56)

Markle,(2) in discussing how to program materials, suggests:

> "The teacher-programmer knows exactly what is happening to the student. The student's responses to these conditions are the events which the programmer observes...On the basis of what went wrong, and where it went wrong, a change in the controlled environment can be made. The new conditions are then tested for their effect of students...The applied scientists, the programmers, vary, revise, and reshape the program until it produces the desired results--learning." (2, P.61)

During the past five years, the writers have been developing and implementing a program for the retarded reader at the secondary level following the procedures advocated by Markle and Brownell. A remedial reading program which consists of a systematically organized set of learning experiences, designed to train students in specific reading skills, is currently being carried out at Irvington High School in Fremont, California. Materials, methods, and procedures which have arisen out of interaction with hundreds of students are used. In addition to developing materials and methods, the authors have attempted to bring under control many other important aspects of the learning situation, and to include information about these as an integral part of the total set of procedures.

Methods used in formulating the components of this program are analogous to those used by professional developers of teaching materials. Writers of these materials draw upon the findings of research, incorporating research-derived principles and generalizations into materials for use in the classroom. The present writers have attempted to carry this use of research a step further--to structure an entire learning environment--an interrelated whole, a set of interactions between methods, materials, students, teachers, and other important aspects of the total situation.

Some major characteristics of this program are listed below:

1. Operant conditioning techniques are used: (a.) to train the student to decode words systematically (b.) to develop the student's verbal repertoire (c.) to shape scholarly attitudes and behavior.

2. Most of the materials and virtually all of the procedures have been developed in the classroom as a result of interaction with hundreds of students who are retarded in reading.

3. All materials and methods are designed to teach directly. No approach is used in which learning is incidental, a "byproduct" of learning experiences selected primarily because of intrinsic interest, variety, motivation, etc.

4. The program has been developed with the needs and abilities of secondary students in mind.

b. Objectives of the Program

The overriding emphasis of the program is on the development of those verbal behaviors which are the foundation of communication skill. One cannot read, write, or speak effectively if his word attack is faulty, his repertoire of meanings meager, or if his skill in manipulating these meanings is inadequate.

The underachieving student is usually found wanting in all of the above verbal behaviors. Typically, he went through his early school years weak in the decoding skills of primary reading. In intermediate and junior high school, he experienced increasing difficulty in recognizing words and in getting meanings, especially when encountering polysyllabic words. This problem was further compounded by the additional burden of involved syntax and increasing concept density in his reading material. Thus, these "intake years" failed to provide him with the rich storehouse of meanings and vicarious experiences that books might have provided had he been able to read efficiently.

When this student enters high school, he is unprepared for the demands of the curriculum. Because his verbal recognition skills are weak, his store of verbal meanings small, and because he is inexperienced in the manipulation of symbolic meanings, he is unable to read, write, speak, or even think at the level usually demanded of the high school student.

The objective of this program, then, is to try to fill this void in as efficient a manner as possible--hence--the following goals:

1. To help the student become adept at word attack, so he will be able to quickly sound out and recognize unfamiliar words.

2. To enlarge the student's functional verbal repertoire.

3. To raise the student's level of reading comprehension in materials having increasingly involved syntax and concept density.

II. A DESCRIPTION OF THE PROGRAM

A description of the program follows. Learning experiences used to condition verbal behaviors will be discussed first, followed by a discussion of other factors that are attended to in structuring the controlled learning environment.

a. Learning Experiences Designed to Condition Verbal Behaviors

Tape recorded verbal training lessons are used for almost all of the large group instruction. These presentations, averaging about seven minutes in length, are typically presented both at the beginning and at the end of class periods. Each lesson is designed to develop one or more facets of the student's reading and speaking ability. Typical content of these taped lessons includes the following:

1. word attack training lessons

2. training in reasoning skill, including instruction and practice with analogies, drawing inferences, and learning to acticipate.

3. lessons designed to teach vocabulary meanings through context.

4. lessons specifically designed to develop speaking vocabulary.

5. lessons designed to train students to "read with expression" as an aid to comprehending materials which present difficulty due to concept density and involved syntax.

6. lessons in which current news topics are used to develop interest, increase vocabulary, and to serve as practice materials for reading skill development.

7. lessons to increase speed of word and phrase recognition .

8. informational materials designed to develop scholarly work habits and extinguish unproductive behavior incompatible with learning.

The content of these verbal training lessons does not follow a sequential plan in the sense that certain skills and techniques are covered early in the course, others later on, followed by still others. Instruction in all skills and abilities being developed is continual and ongoing. No skill is ever "covered," assumed to have been learned. Like the singer, golfer, or pianist who practices constantly in an effort to refine and sharpen his ability, so the reader, daily, in short "training sessions," practices the various skills to increase his reading facility.

Using tape recordings for this training has numerous advantages. They free the teacher from the major responsibility of conducting the lesson, allowing her to make oral responses along with the students. This adds additional vitality to the lesson and helps students who are timid about making oral responses to overcome their reticence. Weak responses, confusion, and any student behaviors the teacher may need to attend to can be handled, as the teacher is not engrossed in the logistics of teaching the lesson. Teaching tapes are prepared

when the instructor is alone, unburdened by the presence of students, and when fresh and rested, not when affected by the weariness that inevitably results from the repeated presentation of material to a succession of five or six classes.

1. Developing Word Attack Ability

Materials and procedures which have been developed for the teaching of word attack are based on principles derived from experimental research in operant conditioning. These materials and procedures are described in Conditioning Sounding-Out Behavior in Remedial Reading Students at the Secondary Level (3) from which the following paragraphs are adapted.

Skinner (4) has demonstrated that it is possible to shape and maintain remarkably complex behaviors in both animal and human subjects through differential reinforcement and the principle of successive approximation. In a similar manner, a student's sounding-out behavior can be developed: first, by differentially reinforcing oral successive approximations of the basic phonemes, then by differentially reinforcing oral responses to increasingly complex graphemic units, and finally, by linking together these units through differential reinforcement, achieving the final desired response, the sounding out of the whole word. The further strengthening of learned word parts and the transfer to new stimulus words is accomplished by differentially reinforcing oral responses to unknown stimulus words in subsequent trials, and also in the systematic use of related vocabulary and comprehension materials that call for the continual application of the behaviors acquired during the shaping process.

These principles are implemented through tapes and dittoes specifically prepared to develop word-attack skill. Practice in this skill is heavily stressed in the early stages of the program. As the ability and confidence of the students improve, the emphasis shifts to practice on other skills. However, practice on word attack is provided, to some extent, in almost every verbal training lesson.

A primary purpose of the word attack training sessions is to set up an artificial "secondary reading circle" to provide training analogous to that given in the elementary grades. In the lower grades, the reading student responds overtly to written symbols. Thus, his mistake in reading are evident to him and to the instructor. This reading circle practice is not usually available to the secondary student; furthermore, he would not ordinarily accept it even if it were. Responding to word attack training dittoes in short, frequent sessions provides this needed oral practice without boredom or affront to teenaged dignity.

All word-attack practice is directly related to other materials presented in the same class session. All word attack stimulus items are chosen either from vocabulary words being taught at the time or from words that are part of lessons designed to develop various other reading skills. Success in reading materials presented subsequent to word attack training is contingent upon participation in these practice sessions.

Students are asked to respond orally to a wide variety of stimuli. Included are vowel sounds, syllables, and various other combinations. Practice is provided in connecting syllables in succession and in sounding out whole words with varying degrees of assistance from the materials and from the instructor. Sufficient time is allowed for each student to form and emit his response, after which the correct response is given on tape by the instructor. Complex material is programmed through a series of small steps, thus assuring a high probability of correct responses from students.

All oral responses are made en masse by the entire class. Students respond to a signal given by the instructor on the tape. The instructor's voice identifies the stimulus, then signals the moment for the response with a clicker. This technique prevents the faster student from emitting his response too quickly, thus depriving the slower student of the opportunity of forming his. If the faster student is allowed to emit his oral response as soon as he is able, the slower students soon stop trying. Under this procedure, all students have time to form a response to all items.

This large group method of training in word attack has been effective with students of varied ability. Because materials are "programmed" in small steps of gradually increasing difficulty, and because repetitions are built in over appropriately spaced intervals, virtually all students are eventually able to respond successfully, gradually gaining confidence in their ability to sound out polysyllabic words.

For a few students--those who enter the program as functional non-readers--special taped programs are used. These are supplementary individual tapes that give additional word attack training to enable students to independently read the correlated written material that follows. These individual instructional units are called "tutor tapes," as they individually tutor these students, enabling them to work through assigned material without a remedial teacher constantly at their side.

2. Developing a Verbal Repertoire

Skinner, (6) explaining the antecedent conditions necessary for chaining a sequence, states: ".... verbal stimulus will be an occasion for the reinforcement of a verbal response of different form when, for any reason, the two forms frequently occur together...the more complex the stimulus pattern, the more specific the verbal occasion, the stronger the control exerted over a single response." (4, P. 75,76)

By setting up frequent occasions where we reinforce responses to stimulus words embedded in specific and complex defining contexts, we increase the probability that the future occurrence of the latter will yield the former. The effectiveness of these contingencies can be optimized by choosing associations for the stimulus words which are most likely to occur in the verbal community of the high school student. Through the use of these procedures, the student learns to associate a stimulus word with a specific controlling context having a vivid semantic or systactic referent.

These principles are also implemented through taped verbal training lessons correlated with dittoed stimulus sheets. Vocabulary materials are divided into three categories for teaching purposes. Criteria for categorizing the words are: 1. the difficulty of learning the meaning of the word from context and 2. purpose for which the word is to be learned.

The first category, words which students are to learn for emission purposes, consists of words which are pivotal in nature, words which are necessary if the student is to be able to express himself intelligently on an academic level. These words are presented in groups of ten, embedded in phrases which provide a clear, unambiguous defining context, a context sufficiently vivid to provide associative aids to learning. Training exercises using these words stress the oral construction of the word by the student in response to a context that functions as a stimulus to evoke the word being taught. For example, the word "deterimental" is presented in the context "Cigarettes are detrimental to your health." Later, students will be asked to respond orally when the tape announces:

"Cigarettes are.....to your health. What is the word that means they are harmful, very bad for you? On the click, tell me that word, loudly and clearly. Cigarettes are...(click)"

Students respond: "Detrimental."

Instructor follows student response with: "Detrimental, detrimental to your health."

Students are later called upon, at variously spaced intervals, to respond to other associative exercises using these words. Finally, students are asked, on several occasions, to recall and write these words in response to a written stimulus. These occasions are presented in the form of written "tests." A unique feature of these "tests" is that the student cannot get less than 100% correct responses. If he has trouble responding correctly, he is coached with oral "mini-lessons" by instructors until all answers are correct. Tests are used, not to discriminate between students for grading purposes, but as another vehicle for evoking and reinforcing correct responses.

A second group of words, chosen because of difficulties inherent in deriving their meaning from context, is presented during verbal training sessions several times during the week. Students are trained to make oral responses to these words, but training is not so intensive as for the emission words in the first category. These words are also presented in vivid defining context. The procedure used is to discuss these words in their context very briefly, using only one meaning for each word, usually the most common. These words are then reviewed even more briefly at various intervals, each session requiring students to respond orally. These are eventually offered in "speed reading phrases;" students practice reading the words in phrases at increasing speeds.

A third category of vocabulary words is presented during taped verbal training. Words in this category are more numerous and are less intensively taught. These are words whose meaning can be partially understood from context, but which are often inaccurately or incompletely grasped. This group is usually combined with other words chosen primarily for word recognition practice.

All of the words chosen, regardless of category, are further reinforced when the student encounters them in his comprehension materials, as virtually all were selected from a relatively restricted group of materials used for comprehension practice. One reason for restricting the variety of materials used is to insure repeated student contact with ... words, idioms, and concepts taught during the verbal training sessi...

Several criteria determine which words are selected for inclusion in the vocabulary program. All words taught are primarily "information oriented" rather than "literature oriented." Words that will probably be acquired in the course of everyday experience are studiously avoided. All words chosen are those which would presumably pose difficulties for the preponderance of students. Words that may trouble particular individuals because of poor academic background, bi-lingual homes, cultural differences, etc., are not included. Help is given on these words individually during guided comprehension practice.

3. Improving Reading Comprehension

To develop facility and accuracy in various reading situations, students receive guided practice in reading and responding to materials of increasing difficulty. Comprehension practice materials, suited to the needs of each student, are selected from among those offered by publishers. Students are instructed to read the materials and to answer only those questions which deal directly with comprehension. (Publishers frequently include collateral activities designed to build various skills associated with reading. Experience has shown that this can be self-deafeating--as--when students are confronted with a potpourri of activities, interest, involvement and a sense of direction often fail to develop.)

Another important aspect of comprehension-building is an emphasis on practice materials offering short narrative content and high response frequency. Students who spend most of their class time reading materials which have lengthy narrative, and who follow this reading by answering a few questions (or by answering no questions at all because the period ended before they finished reading) give little or no evidence to the instructor that comprehension is taking place. For this and other reasons, materials are emphasized which have relatively short narrative selections, followed by questions which require the learner to make frequent discriminations with respect to comprehension. Thus, the student quickly exhibits his understanding (or the lack of it) to the instructor, who can act quickly to help him.

The task of the instructor during comprehension practice is quite specific. His primary duty is to answer students' questions, e.g., word recognition questions, word meanings, etc. This is facilitated by instructors making it evident that he wants to help, by being constantly available, by accepting all students' questions--even naive ones--with a totally accepting and impartial attitude.

Students read individually assigned materials, record their responses on answer sheets and check their own work. After marking incorrect responses, students check back over items missed, ascertain the reason for the error, and, once the item is understood, write an "o.k." on the item missed. If the student cannot arrive at an answer, or if he is unable to understand an item he missed, the instructor is called to help. In the early stages of the program, students tend to violate these procedures by writing "o.k.s" on items they do not understand or by copying answers out of the answer keys rather than honestly figuring them out. These practices are quickly remedied by an alert instructor. Since the teacher is continually in personal contact with each student, closely supervising his individual work, these patterns quickly become apparent. Without punishment, reprimand, or haranguing, these deviant patterns are changed. Correct procedure is patiently retaught to the deviant student and his honest efforts to follow good practices are strongly reinforced. Students soon come

to realize that the grade in the course is entirely contingent upon working honestly in the prescribed manner, not upon the quantity of written responses nor upon high scores. He discovers that the instructor is sincerely concerned with his individual progress, and he commences to work diligently, responding honesly to questions and correcting errors properly, asking for help when needed and writing "o.k.s" only when he has thoroughly understood his errors.

b. Variables Attended to in Structuring the Controlled Learning Environment

Control of as many as possible of the conditions of learning is basic to the successful implementation of the program. This includes not only control over teaching materials and methods, but numerous other aspects of the total learning environment. These are discussed below. In the design for replication now being developed, much additional specific information as to the control of these learning conditions is being included.

1. Shaping Scholarly Behaviors and Attitudes

The objective of the program, as previously stated, is to develop the student's verbal ability. Materials and procedures have been specifically devised to achieve this goal. The next step, then, is to encourage the student to cooperate. Therefore, all motivational activity in class is directed toward <u>instilling a scholarly attitude toward learning</u> and toward building a positive self-image in the student, one of identification with scholarship. Thus, the emphasis is placed on motivating the student to address himself to learning experiences specific to the chosen goals, rather than on learning experiences that are intrinsically interesting, but often related to the goals only in an indirect manner.

Procedures have been developed for achieving these motivational objectives. Day-to-day teacher behaviors are being specified for all phases of the program. These include specific questioning, prompting, and motivational techniques, all of which have been observed to be effective during the development of the program. They are, of course, numerous, but, since they tend to fall into categories, and because patterns tend to repeat, their replication is possible.

All materials and techniques used for motivational purposes are designed to train the student in self-supporting scholarly behaviors. The goals of the course are made clear to him. He learns that the course has been specifically designed to develop his scholarly capabilities, his verbal abilities, perception skills, recognition and emission vocabulary, his ability to deal with involved syntax, and

his understanding of important concepts. He learns why some pleasurable activities usually conducted in reading classes must be foregone in this course, as they are less than optimally efficient in reaching the chosen goals. Students also learn that behaviors which are incompatible with learning, e.g., talking in class, distracting others, high absence rate, etc., are unacceptable in this course. Once the students understand the goals of the program and the reason for the procedures necessary to the attainment of these goals, cooperation is forthcoming.

One example of a specific device which is an integral and important part of this shaping endeavor is the "Interim Class Work Report," which has been designed in pursuance of reinforcement theory. The theoretical rationale, description, and procedure for using this device follow:

Skinner, (5) explaining the advantage of a variable-interval schedule, points out that an organism responding to a fixed-interval schedule will slow down directly after each reinforcement. To eliminate this period of lowered rate of response, he suggests the use of the variable-interval schedule.

"Instead of reinforcing a response every five minutes, for example, we reinforce every five minutes <u>on the average</u>, where the intervening interval may be as short as a few seconds or as long as, say, ten minutes. Reinforcement occasionally occurs just after the organism has been reinforced, and the organism, therefore continues to respond at that time...It is usually very difficult to extinguish a response after such a schedule. Many sorts of social or personal reinforcement are supplied on what is essentially a variable-interval basis, and extraordinarily persistent behavior is sometimes set up. (5, P.101-102)

This principle is used, in this program to shape scholarly behavior. A report card, specifying twenty-three behaviors most often exhibited by "A" students, is issued on a variable-interval schedule, with an average interval of one week, where the intervening interval may be as short as one day or as long as two weeks. If a student has exhibited these behaviors during this period, he receives four points. If he receives less than four points he has only to look at the list of behaviors specified below to find out where improvement is needed. If his behavior is unworthy of any positive points, he receives none for that week. Grades are assigned according to the total number of points accumulated during the marking period, according to a prearranged standard--not a class curve-- so that a student has only to compare his accumulated points with the total needed to see what he can hope to achieve. <u>In this way, desirable behaviors are consistently pointed up and reinforced and undesirable behaviors are allowed to undergo extinction</u>. Experience with this procedure has

shown that students will strive continuously and diligently toward becoming "A" students, if it is shown that this standard can be reasonable attained, and if the reinforcing contingencies are always made clear.

Remarkable changes in attitude, work habits, and classroom behavior have been effected in a short space of time through the use of this grading procedure. Anxiety is kept at a minimum because the student is not in competition with others in the class who read better than he does. Motivation remains high, because the student soon comes to realize that the teacher's function is to help him read better--not to assign work, test and rank him, then give him a "D" or "F" because he happens to score low on the class curve.

2. Pupil Placement According to Word Attack Proficiency

The program is taught in two separate sections. The approach in each is identical, except for one aspect--instruction in word attack. All students who have severe word attack deficiencies are placed in one section where this training is emphasized; students with minimal word attack problems are placed in the other. This year, because the investigators are carrying only two classes, course offerings are restricted to students with pronounced word attack deficiencies.

This placement procedure follows a basic distinction in reading methodology, long observed in teaching practice--that distinction between methods used with the student who is able to "read" (i.e., recognize words independently) and those used with the student who cannot. The latter is, in many ways, (regardless of his age or tested grade level) an elementary level reader, as he has never mastered basic word attack skills taught in the earlier grades.

Few would disagree that there is a fundamental difference between the approach needed to teach the "elementary" reader and that used to teach the student who is fully capable of independent reading. The "elementary" reader needs interaction of an oral nature; e.g., help in sounding out words, in distinguishing between vowel sounds, etc. Often he should be taught in small groups and may require a good deal of teacher attention and support. Secondary students who read independently, on the other hand, may become bored, annoyed, or even embarrassed at being part of a class which includes such activities. The independent reader requires quiet classes, an opportunity to concentrate on his work and help with such problems as word meaning, understanding concepts, unraveling syntax, etc.

3. Other Relevant Variables

A list follows of some of the important factors that must be attended to in successfully implementing this program. Although much

has been accomplished in developing the program to a stage where it can be successfully replicated, a good deal still remains to be done, due to the complexity of the task.

1. The rationale for the entire program is being delineated for the information of instructors, together with reasons for major decisions made during the course of its development. This is being done to enable instructors to proceed with the conviction that, if properly implemented, the methods, materials, and other procedures will achieve the chosen goals.

2. All materials (other than those developed by writers) are being listed. Specific trade materials used are being listed, together with complete directions for using these materials within the context of the program's objectives.

3. Instructions for implementing the program under a team teaching arrangement are being given. This use of personnel offers numerous advantages. a)flexibility in planning for group and individual needs, thus enabling effective teaching of a wide range of ability levels in one class. b)economy, as remedial teaching can be effected with a relatively high pupil-teacher ratio, because one teacher can handle most of the students while another works with individuals or small groups.

4. An inclusive description of the trouble spots in teaching, evaluating, grading, class management, etc., is being completed, including solutions specific to each.

5. Responsibilities of the Counseling department and school administration are being described. The importance of full support here cannot be overestimated. Unless the school administration places high priority on the development of verbal skill, has full confidence in the program, and is willing and able to back its convictions with needed changes, this set of procedures has small chance of being implemented successfully.

B. EXPERIMENTAL EVALUATION OF THE PROGRAM

A study to determine the relative effectiveness of this reading program on the achievement of high school students reading well below grade level expectancies has just been concluded. This study was made using freshman and sophomore students at Irvington High School in Fremont, California. Irvington High is in an industrial suburb in the San Francisco Bay Area; students come from a predominantly blue-

collar background. About one-third of the students in the experiment are of Mexican-American extraction.

I. Conditions

1. From the freshman and sophomore students of Irvington High School who scored two or more years below grade level on the Gates-McGintie Reading Test, two groups were formed, matched on age, reading comprehension scores (Gates-McGintie test) California Phonics Test scores, and I.Q. as measured by the Otis Quick-Scoring Mental Ability Test.

2. The matched pairs were then randomly assigned to two control groups and two experimental groups of twenty-five students each.

3. All students included in this study, both experimental and control, were also enrolled in "C" section (lowest track) English classes, in which they studied the various language arts, course content varying somewhat according to the instructor.

4. At the close of the school year, May, 1969, all students were post-tested with alternate forms of the Gates-McGintie Comprehension Test and the California Phonics Test.

5. To determine whether the difference between the mean pre- and post-test scores of the experimental and control groups approached significance, statistical analysis was made of the obtained data.

6. Null hypothesis: There will be no significant difference between the mean pre- and post-test scores of the experimental and control groups.

II. Procedures

The program of the experimental group included five hours per week in the reading lab. This time was divided approximately as follows:

1. On Monday, Wednesday, and Friday, the students underwent two verbal training sessions, each lasting seven or eight minutes, one at the beginning and one at the end of each period. The remaining time was spent in guided comprehension practice, with individual help provided by two instructors. On Tuesday, the vocabulary for emission purposes was presented and responded to orally

during a seven to eight minute taped session. The remaining time on Tuesday was either used for recreational reading or guided comprehension practice plus a concluding seven minute verbal training tape. On Thursday, the students responded orally to a verbal sequencing sheet, composed of emission-type words for improving oral expression. This practice was immediately followed by a written "test", where students once again responded to a cumulative group of emission-type words. If any time remained, (usually only to the fastest students) they continued their individual work on the comprehension materials.

2. Students in the control groups spent an equal amount of time--five hours per week--in various other courses as individually recommended for them by counselling staff.

III. Analysis of Data

Examination of these data (see Table 1) indicates the following:

1. There were minor mean differences between the experimental and control groups at pretest time on the Gates-McGintie Reading Comprehension, California Phonics, and Otis I.Q. tests. However, these differences were sufficient to produce *t* test values of only -.26, 124, and .06 respectively, each of which fails to reach significance at the .05 level.

2. The between-groups post-test *t* value of 3.64 and 4.06 on the comprehension and phonics tests reveal that the average performance of the experimental and control groups was significantly different at the final trial of the experiment.

3. Both the experimental and control groups exhibited statistically significant within group pre to post gains on the comprehension and phonics tests. These pre to post within-group mean gains were significant at or beyond the .01 level with but one exception; the control group gains on the phonics test were significant at the .05 level.

TABLE I

Summary Statistics For Pre And Post Test Analyses
Of Experimental And Control Group Test Variables

Test	Experimental Group (N=41)			Control Group (N=41)			Difference		
	Mean	Standard Deviation σ	Standard Error σ_M	Mean	Standard Deviation σ	Standard Error σ_M	$M_E - M_C$	σ_{D_M}	t
Gates-McGintie Comprehension Test									
Pre Test	29.1	6.89	1.09	29.5	6.99	1.11	- .4	1.56	- .26 (N.S.)
Post Test	36.7	5.69	.89	32.0	5.86	.93	4.7	1.29	3.64**
Gain	7.6	4.38	.69	2.5	3.81	.60	5.1	.92	
t	11.01**			4.17**			5.54**		
Calif. Phonics									
Pre Test	42.7	9.66	1.53	42.2	8.88	1.40	.5	2.07	.24 (N.S.)
Post Test	52.0	8.70	1.38	43.8	9.34	1.48	8.2	2.02	4.06**
Gain	9.3	6.01	.95	1.6	4.03	.64	7.7	1.15	
t	9.79**			2.50*			6.69**		
Otis I.Q.									
Pre Test	84.5	6.95	1.10	84.4	7.09	1.12	.1	1.57	.06 (N.S.)

N.S. = not significant
* = significant at the .05 level
** = significant at the .01 level

4. In testing the significance of the difference in gains in the two groups, the t values of 5.54 and 6.69 are both well beyond the .01 level of significance.

5. A null hypothesis of no significant difference between means is supported for each of the pretest means and is rejected for all other tests of mean differences.

These findings would appear to lead to the following conclusions:

1. Although the groups cannot be considered "equal" at the beginning of the study, the insignificant t values resulting from the pre-test analyses of means suggest that the groups were probably not initially different as measured by the three pretest variables.

2. The average post-test performance of the experimental group exceeds that of the control group on both the comprehension and phonics tests.

3. Although both experimental and control groups made significant pre to post mean gains, the magnitude of the t values for the experimental group suggests that the gains for this group exceed the mean gains of the control group on both tests.

4. The significant t test values resulting from the analyses of the difference in gains in the two groups indicate that the mean gains of the experimental group clearly surpass the mean gains of the control group on both the Reading Comprehension and phonics tests.

IV Limitations on the Conclusions of the Study

Several limitations restrict the conclusions which may be derived from this study. First, the teacher variable has not been controlled, as the investigators themselves implemented the teaching program. As has already been stated above, the primary purpose of this grant was to revise and further develop this teaching program. This, of course, necessitated that investigators also be the instructors. Also, the authors recognize the multiplicity of variables being evaluated in this study. In this connection, they have already expressed their rationale for treating the entire program as the experimental variable. It is felt that the purposes of this research are better served by evaluating an organized, interrelated program than by manipulating any single one of the many experimental variables in the program.

C. POSSIBILITIES FOR FURTHER RESEARCH AND DEVELOPMENT

A great deal of materials has been written, tried out, revised, and discarded in developing this reading program. Additional revisions and additions in material and controlling conditions need to be made before this progran can be replicated by personnel other than the present instructors. In this connection a project planned for the near future is a set of complete daily lesson plans for the entire course, integrating all of the materials and procedures used in the program.

At present, a complete strategy for communicating the implementation of the "controlled learning environment" to other teachers remains to be worked out. Writers believe that effective dissemination and implementation of this program using other personnel can best be effected through the same type of "What happens if?" approach used in developing the teaching program. Essentially, this would mean developing a teacher training program through an analysis of teacher behavior in response to training in the use of the materials and procedures which comprise the program.

D. CONCLUSIONS

The teaching methods, materials, and other procedures used in this program appear to constitute a promising attack on retardation in reading. Because extensive use is made of the aural reinforcement of sound-symbol relationships, the word attack procedures appear to be effective in teaching students who have long-standing word-recognition handicaps. Procedures used to increase verbal repertoires give evidence of adding substantially to students' store of verbal meanings, both in recognition and usage aspects. Scholarly work habits, pride in achievement, and concern for accuracy are instilled through reinforcing procedures and a controlled environment. A positive self-image vis-a-vis the classroom arises as negative attitudes undergo extinction.

This is a total, integrated program for building reading skill, which includes all necessary materials, and uses procedures that are objective, specific, and detailed. Therefore, it could become a prototype, a model reading program, applicable to a variety of school situations, and a point of departure for further experimentation. With suitable revisions and modifications, it could be used in the elementary grades, for adult education, or in any other educational situation where an integrated sequence of learning experiences is needed to develop the basic skills of reading.

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